Open Access
J. Glob. Innov. Agric. Sci., 2026, 14(1): 303-311
ISSN (Online): 2788-4546; ISSN (Print):2788-4538
DOI: https://doi.org/10.22194/JGIAS/26.1733
http://www.jgiass.com

Design and Practice of Local Agricultural Extension based on a Knowledge Management System in Purworejo Regency, Central Java, Indonesia

Subejo*, Hanita Athasari Zain, Najmu Tsakib Akhda, Ishadiyanto Salim, Fairuz Husna Aida, Septi Nurhasanah, Beny Nabila Happy Fauziah, Pristianti Krisna Guslimantasya and Agrit Kirana Bunda

Faculty of Agriculture, Universitas Gadjah Mada, Indonesia
*Corresponding author's e-mail: subejo@ugm.ac.id

Good practices of agricultural extension activity require a set of objectives which are arranged through a well design of extension planning. To fulfill and facilitate various farmer's needs, extension workers should make and manage the extension materials to support extension practices based on their knowledge that has been readjusted to the existing local conditions. Knowledge Management System (KMS) in agricultural sector helps the extension workers to understand the important and urgency in combining explicit and tacit knowledge which very supportive on various extension activities. Focus of this research is to describe the design and implementation KMS by agricultural extension workers at local level. This research has been conducted in Purworejo Regency Central Java with the embedded design of mixed method approach. The research result shows that 35 extension workers although still face several limitations have implemented the KMS basic principles. The process was started from the knowledge creation through websites and other digital sources combined with conventional media, followed by knowledge organization and storage by using information system managed by Ministry of Agriculture (SIMLUHTAN) and digital storage. The final stage was knowledge sharing via WhatsApp and conventional media to other extension workers and targeted farmers and knowledge implementation by reusing and modifying their knowledge as agricultural extension's materials.

Keywords: Extension workers, design, knowledge management system, practice, agricultural extension.

INTRODUCTION

The important roles of agricultural extension activities could be traced from the historical perspective of the community's education in agricultural and rural life, which was pushed by a social barrier, led to the first formal extension activity held in England in 1850. In the agricultural sector, practices of agricultural extension are broadly elaborated as a non-formal education process for adults in order to change knowledge, attitude, and skills, followed by behavioral change to become more independent for increasing production, income earning, and wealthiness of farmers (Hariadi et al., 2023). In the beginning of agricultural modernization, the main goals of extension are focused on technology transfer, provide support in decision making, and build a social support system for farmers (Valera et al., 1987) and directed to achieve the best practices in farming based on farmers' priorities with suitable approach (Landini et al., 2021). In addition, Rohit et al. (2017) stated that extension worker is not only providing consultation related to the latest technology, but also improving the capacity development in supporting agricultural sustainability. This reflects the extension's role as a two-way communication process involving information transfer from one party (extension worker) to other parties (farmers and other partners) to achieve enhanced understanding and application of knowledge understood by farmers which will promote the sustainable farming practices (Managanta, 2020). The roles of extension workers become the essential factor in accomplishing the success of the agricultural extension program and agricultural development. As an agent of change, extension workers have bigger roles beyond delivering information to participants. The important extension worker roles include as educator, motivator, communicator, organizer, facilitator, dynamiser, and innovator, who contribute significantly to create the sustainable agriculture development (Dea et al., 2024). Extension worker as a facilitator helps farmers in decision making and adapt to various new technologies as additional

Subejo, Zain, H. A., Akhda, N. T., Salim, I., Aida, F. H., Nurhasanah, S., Fauziah, B. N., Guslimantasya, P. K., & Bunda, A. K. (2026). Design and Practice of Local Agricultural Extension based on a Knowledge Management System in Purworejo Regency, Central Java, Indonesia. *Journal of Global Innovations in Agricultural Sciences, 14, 303-311.*
[Received 4 Mar 2025; Accepted 2 Aug 2025; Published (online) 1 Sep 2025]
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innovation. Furthermore, Helmy and Haryanto (2018) explained that agricultural extension worker also should be able being a consultant for farmers in building their self-reliance. This indicates that extension workers are required to have great ability in providing solutions based on what farmers need. To fulfill the roles, extension workers need to create a fixed targeted plan of the extension models before they conduct the activities. Extension models are designed based on a solid plan in order to achieve the set objectives. This process is often referred to as extension design. Valera et al. (1987) described a cycle of agricultural extension processes, namely situation analysis, selection of extension programs based on the problems and needs of the surrounding community, designing extension strategies, and evaluation. Situation analysis includes regional and audience analysis. Regional analysis involves natural resources, institutions, facilities and infrastructure, goals and policies, and so on. Meanwhile, audience analysis is conducted through identification of geographic, demographic, psychological, and behavioristic characteristics, so that extension objectives can be analyzed according to target needs. The selection of extension objectives must meet a guidance named SMART (specific, measurable, action-oriented, realistic, time-bound) which helps to ensure the selected objectives are realistic and measurable (Yudha et al., 2024). Identifying the characteristics of the area is key in determining the appropriate methods and teaching aids during extension process. A teaching aid is an object that can be observed, touched, heard, and felt by the human senses which has a function to demonstrate and explain the description verbally by the extension worker. With the existence of heterogeneous stakeholder groups and individuals involved in agricultural extension practices, mainly extension institutions or extension workers and farmers group, an effective Knowledge Management System holds an important and substantial role in providing information/knowledge they require (Tumwebaze et al., 2024). KMS defines the acquisition and transfer of knowledge assets, which are essential for farmers and extension workers to share best practices and agricultural advances (Ferroni & Zhou, 2012). Effective KMS helps extension workers to increase their productivity by ensuring that important information is systematically gathered, arranged, and disseminated. This is in line with (Salama, 2019) who stated how important to integrate knowledge management systems in agricultural extension. Studies related to the design and implementation of knowledge management systems in Indonesian agriculture have generally been focused on the technical aspects of designing systems or applications and KMS development for very specific of agricultural practices or activities. The KMS study by Budiman (2016) is related to a prototype of an integrated agricultural and inland fisheries knowledge management system. Wijaya (2024) reported the use of KMS in discussions between dragon fruit farmers. A study on the implementation of knowledge management in the agro-industrial supply chain system has been reported by Iriani (2010). The use of KMS in farmer groups has been studied by Asa et al. (2017). Meanwhile, Fahrizal (2017) reported on the Analysis of Knowledge Management Systems at Repong Damar Agroforestry in Krui, Lampung, West Coast. However, studies related to the design and implementation of knowledge management systems in local-scale agricultural extension and extension workers at the regency level with a meso and macro approach in Indonesia are still very limited. Studies related to extension have been carried out, but only in a specific scope on a micro scale, such as that carried out by Nganga (2014) with a study focusing on the development of an SMS gateway-based application for horticultural crop extension. Therefore, this research aims to explore deeper the existence of the knowledge management system as a fundamental agricultural extension activity in supporting agricultural and rural development in local level which has high potency on agricultural resources namely Purworejo Regency, Central Java, Indonesia. Agricultural extension policies and practices at national and local level in Indonesia are experiencing dynamic changes. As reported by Subejo (2006) and Subejo (2011) in the last twenty years, agricultural extension in Indonesia has been adapting to decentralization, democratization, privatization and liberalization policies. In the process of adaptation and strengthening the effectiveness of agricultural extension services at local level such as regency, KMS of agricultural extension services needs to be well designed and implemented properly so that it can adapt to the dynamic of change and appropriately respond to the complex challenges and problems of national and local agricultural development. The implications and study findings will be very prospective for mapping and understanding the existing conditions of KMS design and implementation which can be used as worthy input to increase the effectiveness and optimization of agricultural extension services at the regional level in Indonesia.

MATERIALS AND METHODS

***Location and Respondents*:** This research was conducted in Purworejo Regency which widely acknowledge one of main food production centers in Central Java (see Figure 1). Based on data from Statistics Purworejo Regency (2024), Purworejo has 19,62% labor force as farmers and the agricultural extension institution exists to support the farmers.

This research used 35 of 47 agricultural extension workers who participated in a focus group discussion on 16 October 2024. During the FGD, 47 participants were invited, consisting of agricultural extension workers assigned to the district agricultural office, extension coordinators at the sub-district level by inviting 1-2 agricultural extension officers from each sub-district. In the FGD, in-depth discussions were held among participants regarding the experiences of

designing and implementing KMS in the extension program as well as various problems and potential for developing KMS to support various extension activities. At the end of the FGD, participants were asked to fill out a structured questionnaire. Of the total 47 participants, the questionnaires that were filled out were carried out by 35 extension workers so that quantitative data from these extension workers were used in the analysis. Meanwhile, qualitative data was obtained from the FGD which was attended by all participants, 47 agricultural extension officers.

Figure 1. Map of Central Java.
Source: Adapted from https://www.alamy.com/jawa-tengah-central-java-administrative-and-political-vector-map-indonesia-image235744516.html

***Data collection and analysis*:** This research used qualitative data as the primary data collected by conducting a focus group discussion. In addition, quantitative data is being used to supplement the primary data collected by using a structured questionnaire to provide descriptive statistics. Data collection related to knowledge creation, organizing, sharing and application was carried out through a combination of FGD summary results, survey questionnaires and documents from the district agricultural office. The application of embedded design in this study was carried out through a process of integrating quantitative and qualitative data where quantitative data supports qualitative data or vice versa.

RESULTS

***General condition of local agricultural extension*:** Structurally, various administrative activities and agricultural extension services in Purworejo Regency are managed directly by the division of infrastructure and agricultural extension. The organizational structure of the Office of Food Security and Agriculture of Purworejo Regency consists of the head office and the secretary office who are incharge of four divisions, namely: [a] division of food, [b] division of agricultural facilities and protection, [c] division of animal health and veterinary public health sector and [d] division of agricultural infrastructure and agricultural extension. Each division is supported by several implementing staff who handle office administrative services and field services to the agricultural community. Agricultural extension officers are located in the regency office and agricultural extension center in each sub-district. In each extension center, activities are managed by an extension coordinator and supported by 4-6 agricultural extension field officers. On average, each agricultural extension field officer serves 2-3 targeted villages. The condition of the number of staff and the average number of villages served by each agricultural extension worker in the field is still above the target of the Ministry of Agriculture where each village is targeted to be served by one extension worker. The large burden of extension services by each extension worker to some extent will also have implications for the effectiveness and performance of agricultural extension services. The position and roles of agricultural extension workers in Purworejo Regency have been regarded as strategy of farmers' empowerment human resource capability improvement through agricultural extension activities and services, especially in local level which needs to be in line with farmers characteristics and condition. General characteristics of 35 agricultural extension workers in the study site consist of age, education, and working experience (Table 1).

***Age of agricultural extension workers*:** The age ranged 27-58 years with an average of 40 years, which included in productive age (15-64 years).

***Education of agricultural extension workers*:** The education in this study refers to formal education where the educational background of agricultural extension workers is in range of 12-18 years, which means that the lowest education level is high school and the highest is master's degree.

Table 1. General characteristics of agricultural extension workers in Purworejo Regency.

Category	Maximum	Minimum	Average
Age (years)	58	27	40
Education (years)	18	12	16
Working experience (years)	35	2	13

Source: Primary data, 2024

***Working experience of agricultural extension workers*:** Extension workers' working experience (Figure 2) was measured by the length of time in years they have been working as an agricultural extension worker in Purworejo Regency. The average is around 13 years, with a minimum of 2 years and a maximum of 35 years. Most of them (91%) have 2-18 years of experience in working as agricultural extension workers. Meanwhile, the other 9% have more work experience in a range of 19-35 years.

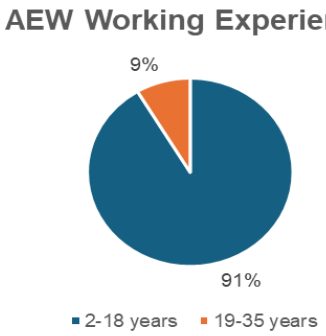

Figure 2. Agricultural extension workers' working experience in Purworejo Regency.
Source: Primary data analysis, 2024

***Knowledge Management System (KMS) in local agricultural extension program*:** The implementation of knowledge management system (KMS) in agricultural extension program in Purworejo Regency is supported by several digital sources, mainly to assist agricultural extension workers in creating and sharing knowledge.

***Creating Knowledge*:** Extension workers primarily obtained information from websites, sub-district level extension workers, WhatsApp, webinars, and YouTube. This phenomenon shows that the formation of extension workers' knowledge is dominated by explicit knowledge (Figure 3). Various sources of agricultural information have been very important for field extension workers in creating various agricultural knowledge. In addition to utilizing various new media platforms via the internet, agricultural extension workers also still utilize conventional media that still exist and are utilized by both agricultural extension workers and farmers. Conventional media that are still utilized include television, radio, print media, group meetings, field and farmer visits, farmer reports and face to face communication with targeted farmers and extension partners. Electronic media such as television and radio as well as print media that are utilized and can be accessed by agricultural extension workers come from the national, provincial and district levels. Agricultural extension workers utilize various materials and information obtained as extension materials through the process of selecting and grouping as well as combining media and material content which can then be categorized as creating knowledge.

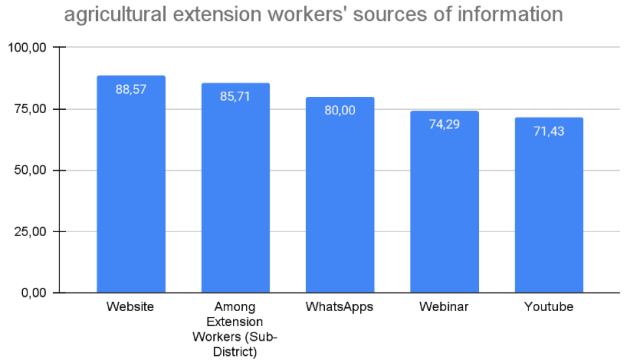

Figure 3. Sources of information used by agricultural extension workers in Purworejo Regency.
Source: Primary data analysis, 2024

***Organizing and storing knowledge*:** Extension workers utilize an information system named "Agricultural Extension Information System" (SIMLUHTAN) provided by the Ministry of Agriculture. Extension workers also documented field experience and best practices digitally, using cameras and videos. Each agricultural extension worker has an access account on SIMLUHTAN which among others has a report menu, data update, storage and data retrieval. Therefore, in principle SIMLUHTAN can function as a platform to organize and store various knowledge related to agricultural practices, governance and policies.

***Sharing knowledge*:** Agricultural extension workers in

Table 2. Aspects and implementation of KMS for agricultural extension services in Purworejo Regency.

Aspects of KMS	Description	Level of implementation
Creating Knowledge	Agricultural field extension workers have combined conventional method (knowledge exchange among extension officers) and several new media (internet and social media).	High level
Organizing and Storing Knowledge	Agricultural field extension workers have been using extension platform developed by Ministry of Agriculture mainly for reporting the activities as targeted program by the ministry. However, they still lack of capability in organizing and storing various knowledge on agricultural policy, program and practices.	Moderate Level
Sharing Knowledge	Agricultural field extension workers have been sharing knowledge through conventional method including group meeting, farm visit and even though still limited they share the knowledge to farmers and farmer groups through social media. In general, agricultural field extension workers are still facing various problems in sharing knowledge effectively.	Moderate Level
Applying Knowledge	Agricultural field extension workers have been starting to combine formal knowledge of agriculture from various sources and tacit-local knowledge. However, they are still facing various problems in proper combining of formal and tacit knowledge of agriculture practices and management.	Moderate Level

Purworejo Regency share agricultural knowledge with farmers and help solve their problems in the field. In the process of sharing knowledge, information and best practice experiences, agricultural extension workers carry out several strategies including posting on the extension office website, sending materials via WhatsApp groups, sharing materials during field visits, group meetings and individual meetings with farmers. The study results showed that in the process of agricultural knowledge sharing, the top five obstacles among extension workers were: 1) lack of training for extension workers, 2) excessive workload, 3) lack of human resources in the work area, 4) lack of support from the local government, and 5) inadequate facilities.

***Applying knowledge*:** Extension workers use information technology, such as WhatsApp and websites, to gather and adapt knowledge from various sources into extension materials. They adjust scientific knowledge to align with farmers' local (tacit) knowledge for effective application in extension activities. They are still facing various problems in proper combining formal/explicit and tacit knowledge of agriculture practices and management.

In the application of knowledge, one of the crucial things is to combine the modern agricultural knowledge that is usually general in nature with the empirical long experience of farmers or extension workers who have been practicing agriculture for a long time so that they have local knowledge and wisdom that is in accordance with local conditions and characteristics. The ability to adapt, justify, synchronize and integrate between modern agricultural knowledge that is formal and empirical practice that is tacit in nature needs to be continuously carried out between agricultural extension workers and farmers so that they gradually find the most appropriate model and formula and have positive value for improving sustainable agricultural practices and productivity.

DISCUSSION

In the context of local development, as the implementation the concept of demand driven extension services, the position and roles of agricultural extension workers in Purworejo Regency has been regarded as strategy of farmers empowerment through agricultural extension activities and services, especially in local level which needs to be in line with farmers characteristics and condition. Agricultural extension workers are the main actor to assist and facilitate various farmers needs in achieving their prosperity (Suryono et al., 2022). Extension agents as the frontline of agricultural development programs are required to have the ability of changing farmers' perception, attitude, and behaviour in order to have more built understanding and skills. Therefore, it is needed to identify the characteristics of agricultural extension workers, especially their education and working experience. These characteristics will show how much knowledge they have and how strong their motivation is (Rosmalah et al., 2023). A study on relationship of age and performance of extension workers (Mphepo & Urassa, 2023) showed that age does not affect the services from extension workers, since they are already aware of their responsibilities as extension worker. In addition, another study (Prihtanti & Zebua, 2023) confirmed that age of extension workers has no strong connection with their abilities and willingness to improve their capacities as extension workers and education level of extension workers does not show any difference of their readiness to be extension workers in fostering the farmers in their farming business. Prihtanti and Zebua (2023) also indicates that working experience is the most important characteristic of extension workers. In this research, data shows that extension workers' working experience was measured by the length of time in years they have been working as an extension worker in Purworejo Regency. According to Table 1, we can conclude the average of extension workers' working experience is around 13 years, with a minimum of 2 years and a maximum of 35 years. This characteristic leads to an understanding of how agricultural extension workers might give their best services to the farmers and their ability in maximizing the job performance (Puspaningtyas et al., 2024) to conduct the appropriate extension activity as what farmers need, mainly from their own test or observation through a period of working time (Wulandari, 2015). Knowledge management system is a strategic tool to help manage information systematically in the agricultural sector. KMS refers to a system of action on knowledge, which includes the establishment of strategies and procedures, with the utilization of appropriate technology (Lai, 2005), so that the process of knowledge management can be carried out effectively and achieve the objectives of problem solving and decision making (Buitendag & Hattingh, 2024). There are at least five main processes in KMS, namely acquiring or creating, organizing, storing, sharing or disseminating, and applying (Vangala et al., 2015), as shown in Figure 4.

Although there are several steps in KMS, previous research by (Arum, 2021) highlighted three main steps, that are knowledge acquisition and creation, knowledge sharing, and knowledge application/applying. Experts in KMS added more explanations related to the knowledge sources. There are two types of knowledge sources in agricultural sources with KMS based, that are tacit knowledge and explicit knowledge (Cheruiyot et al., 2020). These different sources also mentioned by Gardeazabal et al. (2021), where knowledge management system is a process that contains of knowledge within and outside the individual or organization to achieve goals. Tacit knowledge is a local knowledge based on extension workers' practical experiences that contain a deep understanding of local resources and culture that is difficult to express explicitly (Gardeazabal et al., 2021).

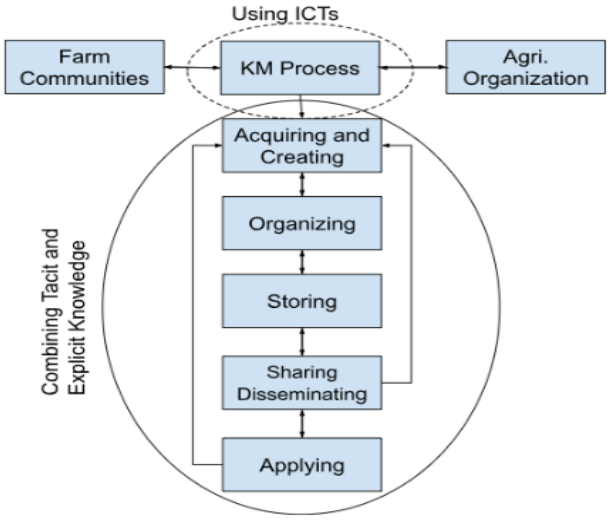

Figure 4. KMS model in agricultural extension.
Adapted from Vangala et al. (2015)

On the other hand, explicit knowledge is knowledge that has been proven and documented based on scientific research (Kothari et al., 2012). Explicit knowledge correlates with information and data making it easier to manage (Korani, 2018). In simple terms, Li & Zhao (2023) defined explicit knowledge as knowledge derived from expert, academic, institutional, and scientific knowledge. Research finding shows that some explicit knowledge is proven to be able to increase productivity in the agricultural sector, although sometimes it is not in accordance with the local conditions and culture of farmers. Thus, the discourse related to the combination of tacit knowledge and explicit knowledge in the application of KMS using information and communication technologies (ICTs) is considered capable of being a prospective solution for extension services in the future. This chapter will discuss further the implementation of knowledge management system in agricultural extension practices in Purworejo Regency.

***Creating knowledge*:** Creating knowledge is the initial stage in KMS when new knowledge is generated. Based on the questionnaire administered in focus group discussions, it was found that the most sources of information came from websites, sub-district level extension workers, WhatsApp, webinars, and YouTube. This phenomenon shows that the formation of extension workers' knowledge is dominated by explicit knowledge. Figure 3 shows that website becomes the most used source of information by extension workers. Extension workers collect and create their knowledge among other extension workers through discussion. Among 5 sources, 4 of them are digital sources that ease extension workers in learning and enhancing their knowledge before they conduct an extension activity. This knowledge is more likely to be explicit knowledge. However, previous research of (Vangala et al., 2015), explicit knowledge cannot guarantee the effectiveness of extension, but it needs tacit knowledge that comes from extension workers' experiences. The experiences of extension workers resulted in knowledge they collected after did various extension activities, farmers' supervision, and also training, which is called tacit knowledge. But, from the focus group discussion, we can understand that extension workers face a difficult time to maintain their relation with farmers regularly due to their excessive administerial workload, so they cannot enhance their tacit knowledge according to their experiences in assisting farmers.

***Organizing and storing knowledge*:** Organizing in a knowledge management system refers to the process of categorizing and structuring information systematically for easy access and use. In the context of agriculture, extension workers utilize an information system named "Agricultural Extension Information System" (SIMLUHTAN) to build a database by organizing information that leads to extension workers' convenience in organizing their knowledge and accessing it anytime (Arum, 2021). This database organizes information based on the category, which there are some categories, that are agricultural institution, extension worker, and farmers group to support knowledge management effectively. Information is being gathered to create a clear structure, so that it can be used easily when extension workers need to look for relevant information. In addition, knowledge organizing based on digital repository becomes the essential solution in storing and accessing knowledge efficiently (Cheruiyot et al., 2020). Before extension workers organize their knowledge to the system, extension workers explained that they usually did a crosscheck of information to other companion extension workers. This way of organizing knowledge shows the awareness of extension workers to decide the correct information as they need to be delivered to the farmers in specific location where the information is suitable. As an informant AR (40) said, he used to make a discussion forum with his partners and leading farmers in order to recheck the knowledge. Knowledge storing is a critical element to ensure that information that has been acquired and created remains available for future use. In the context of agricultural extensions, extension workers use various methods to create knowledge, such as direct interaction with farmers, workshops, and seminars. These methods enable the sharing of tacit knowledge, such as field experiences and best practices (Cheruiyot et al., 2020). This knowledge that gained through such interactions can be stored in various forms, such as manual records, reports, or digital databases (Korani, 2018). According to the FGD result, extension workers used to document field experiences and best practices by utilizing internet and Information and communication technologies (ICTs) using cameras and videos to transform knowledge that is initially temporary and personally obtained into a structured asset that can be shared

in the future. By storing knowledge systematically, extension workers can ensure that relevant information can still be utilized by colleagues and farmers, even after a particular individual is no longer involved.

Sharing knowledge: The knowledge sharing process in extension can influence and shape an individual's attitudes, skills, and behaviors. This process can be direct or indirect (Gardeazabal et al., 2021). Experts stated training programs or extension activity can encourage farmers to come together and exchange ideas (Cheruiyot et al., 2020). This is done by agricultural extension workers in Purworejo Regency, who are incharge of disseminating agricultural knowledge to farmers as well as interacting with farmers to understand their problems in the field. However, both directly and indirectly, the information dissemination process is influenced by social behavior and power dynamics (Gardeazabal et al., 2021). The results of the FGD showed that the main obstacle is related to the lack of support from local government, including the lack of training for themselves as extension workers. This is correlated with another previous study by (Hermans et al., 2015) that found lack of funding, fragmentation within the organization, and lack of capacity to build collaborative innovation networks are the main threats to the ongoing collaboration and learning process. The conditions described above will undoubtedly impact on the efficacy of extension workers in disseminating agricultural information to farmers. This is corroborated by the findings of the research, which 15.7% of respondents have assigned the highest ranking to "limited human resources for extension workers" in regard to current agricultural issues and problems. In addition, Subejo (2025) advocates that in strengthening and completing agricultural innovation, technology and governance services through agricultural extension, a combination and selection of conventional extension approaches, and modern information and communication technology are very necessary. The appropriate combination adapting to the conditions of the agricultural community will be effective within the framework of digital transformation of agriculture in Indonesia.

***Applying knowledge*:** Knowledge applying is often focused on the use of knowledge management systems and information technology systems. As has been done by extension workers, based on the results of the study, it shows that they have utilized information technology in the form of WhatsApp and websites. But not only the system, intensive knowledge utilization is also needed to encourage knowledge reuse (Tumwebaze et al., 2024).

Based on the KMS framework, the principles in knowledge application integrate knowledge sources, local knowledge, encourage co-creation, and consider things that can be adapted to increase knowledge, innovation, and collaboration. However, this research resulted in 89.47% of respondents feeling that extension workers still lack training. This leads to low knowledge of extension workers to be able to apply and share it as a source of knowledge with farmers. In addition, 81.58% of them felt that their workload was too much, which disrupted their time to go to the field to supervise farmers. In fact, to support the KMS framework, there is a need for a feedback cycle that brings extension workers and farmers together for continuous learning improvement (Buitendag & Hattingh, 2024).

***Conclusion*:** Agricultural extension workers in Purworejo Regency to some extents have implemented the knowledge management system in order to design and conduct extension practices in their working areas. Starting from knowledge creating, most of them collected knowledge from website and others digital sources, along with discussion among themselves. In knowledge organizing and storing, extension workers tend to utilize SIMLUHTAN that provided by the government as the main information system of agriculture sector in Indonesia, supported with digital storing method by taking photos and videos that eventually will be used as extension materials. They have always shared their knowledge through WhatsApp and applied the knowledge whenever they conduct extension activity for farmers. Although KMS has been developed and by extension workers in Purworejo Regency, however they are still face several real problems, mainly lack of capacity building programs, excessive administerial workload, and inadequate supporting facilities. This research recommends that agricultural extension institutions in regency level need to be more aware of the workers need, so that they can provide the best extension services to enhance farmers knowledge and achieve farming sustainability. The studies that have been conducted have limitations in terms of the number of agricultural extension workers and the context where the focus of KMS development is only on agricultural extension workers. In further studies, it is necessary to expand stakeholders related to KMS development for agricultural extension, including leading farmers, agricultural industries, communication and informatics offices, NGOs, farmer associations, universities, platform developers, etc. In addition, studies also need to be conducted in districts or regions with different agricultural potencies such as horticultural areas, dry land agriculture, plantation areas, coastal farming areas, fisheries and livestock area centers, etc.

***Acknowledgement*:** Authors wish to thank Universitas Gadjah Mada Yogyakarta for the research funding under Assistance Research Grant UGM (*Program Asistensi Riset UGM* 2024 No.10600/UN1/P4/PT.01.03/2024) and thank the Office of Food Security and Agriculture (DKPP) of Purworejo Regency which assisted for organizing the FGD with agricultural extension workers, field observation and field surveys.

***Consent for publication*:** All authors gave their consent to publish this research article in JGIAS.

***CRediT author statement*:** Subejo designed the experiment, drafting and revising the final manuscript. HAZ, FAA, SN, BNHF, PKG, and AKB, interpreted the results and made the first draft of the manuscript. NTA and IS supervised the manuscript. All authors have read and agreed to the published version of the manuscript.

***Conflict of interest*:** The authors declared no conflict of interest.

***Funding source*:** Program of Assistance Research Grant of Universitas Gadjah Mada Fiscal Year 2024

***Ethical statement*:** N/A

***Consent to participate*:** This research involved officers' management of food security and agriculture and representative of agricultural extension workers from each sub-district and key informant farmers, and they willingly participated in FGD and in-depth interviews without any coercion.

***SDGs addressed*:** Zero hunger; No poverty; Economic growth.

***Policy referred*:** Agricultural extension services; Farmer participation and empowerment; Privatization and liberalization policies

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